The End of the Multifibre Arrangement (MFA) and the Heterogeneous Performance of Quota-Constrained Countries

Working Paper Series

#2013-035

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UNU-MERIT Working Papers

ISSN 1871-9872

Maastricht Economic and social Research Institute on Innovation and Technology, UNU-MERIT

Maastricht Graduate School of Governance
MGSoG

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The End of the Multifibre Arrangement (MFA) and the Heterogeneous Performance of Quota-Constrained Countries

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Version, June 2013

Abstract

On 1 January 2005, the international trade in textile and clothing was freed from the quota restrictions that had persisted for more than four decades. This study tests one of the predictions that countries effectively constrained by quotas in the major world markets will increase their exports at the expense of non-quota-constrained suppliers. The focus is on clothing imports of the two major markets, the US and EU-15. These markets are separately analysed as they constitute different lists of quota-constrained countries, QCCs. Unlike others, this study uses a relatively longer data set of post-quota years, which allows us to understand the medium-term adjustment process of exporters following quota removal. We find a large amount of heterogeneity among the QCCs in their post-quota export performance. Only a few QCCs have benefited at the expense of not only the non-quota countries but also fellow QCCs. The estimates show that almost half of the QCCs were better off under the quota regime at least in terms of exports. The factors most likely to have influenced their heterogeneous performance are also examined.

Keywords: Global apparel trade, Quotas, MFA, Heterogeneous country performance

JEL: F13, F14, L67

*The author would like to thank seminar participants at the 10th GLOBELICS International Conference in Hangzhou, China in November 2012; and the African Growth Initiative at the Brookings Institution, Washington, DC, USA for their useful comments. The author can be accessed through gebreeyesus@merit.unu.edu or mulu.yesus@gmail.com.

1. Introduction

Despite the significant liberalization progress of global trade through the General Agreement on Tariffs and Trade (GATT), Textiles and Clothing (hereafter T&C) was among the few categories that until recently had been under quota restriction in developed countries' markets. Quotas were institutionalized into the international trading system in the 1960s, when the Short-Term Arrangement (STA) and the Long-Term Arrangement (LTA) were agreed for a unilateral quota to be imposed on countries where there were 'market disruptions' on the basis of providing temporary protection for the T&C industry in the developed countries.[1] These arrangements were replaced by the Multifibre Arrangement (MFA) in 1974, which extends the coverage of products under quota (from merely cotton to synthetic fibres, wool, silk and ramie) and the number of countries. The MFA established a quota system that limits the amount of imports of T&C products from developing countries to developed countries. The developed countries, particularly the European Union (EU), the United States of America (USA), Canada, Norway, Finland and Austria, had actively applied the quota system (WTO, 2012).

In 1994, after various rounds of negotiations, an Agreement on Textiles and Clothing (ATC) was reached to eliminate the quota restrictions in four steps over a 10-year period starting in 1995. Following this agreement, T&C was gradually integrated into the GATT and the quota restrictions totally phased out on 1 January 2005. Parallel to the implementation of the ATC, the developed countries, particularly the US and the EU, offered preferential treatment to many developing countries under different agreements.[2] Both the US and the EU also entered into reciprocal free trade agreements (FTA) with their neighbours.[3] The former aims to help the developing countries diversify their exports, while the latter aims to prevent loss of competition of domestic industry by creating regional markets.

[1] The quota restriction has, in fact, a far longer history. In the 1930s and 1950s the developed countries imposed Voluntary Export Restraints (VERs) to restrict import competition of T&C from developing countries.

[2] The US non-reciprocal preferential treatment includes the Caribbean Basin Initiative (CBI), the Andean Trade Preferences Act (ATPA) and the Africa Growth Opportunity Act (AGOA). The EU preferential access includes schemes such as African, Caribbean, and Pacific (ACP) and Everything But Arms (EBA).

[3] One of the notable regional FTAs is the North America Free Trade Agreement (NAFTA), a trilateral trade agreement among the US, Canada and Mexico. The EU has a reciprocal FTA agreement with six Mediterranean countries (EU-MED) and several Central and Eastern European Countries (CEEC), most of which later joined the EU.

The trade policies of the major clothing importer countries, on the one hand the imposition of quotas on exports from certain countries and, on the other hand, the provision of preferential treatment to other selected countries, led to a shift of production from quota-constrained to less constrained (or favoured) nations, thus increasing fragmentation of export sourcing (UNCTAD, 2005). Another notable trend in the two decades prior to the removal of quotas was the increasing regionalization of trade, which stemmed from regional accords such as CBI and NAFTA in the Americas and from association agreements between the EU and neighbouring regions, the Mediterranean and CEEC countries (Avisse and Fouquin, 2001; Elbehri, 2004; UNCTAD, 2005).

The abolition of the quota system was, therefore, expected to reverse these trends. A number of simulation studies forecasted *ex ante* the likely effect of the removal of the quota system on world T&C trade patterns.[4] First, the liberalization of quotas will increase substantially global trade in T&C.[5] Second, the impact is expected to differ among countries depending on their initial conditions and capabilities to respond to the liberalization. Countries effectively constrained by quota will increase their exports at the expense of countries that developed their export under preferential treatment in the major markets.[6] Third, the removal will most likely reverse the international fragmentation of the supply chain and lead to a high concentration of production in countries with large producing capacity, such as China and India.[7] The implication is that the QCCs will not benefit equally from quota removal. Different factors, including restrictiveness of the quota limit, economies of scale, local textile base and other sources of competitiveness, might influence the relative post-quota-period performance of the QCCs (Adhikari and Yamamoto, 2007; Brenton and Hoppe, 2007).

[4] OECD (2003) and USITC (2004) have excellent review on the quantitative predictions of the impact of quota removal.

[5] Diao and Somwaru (2001) estimated that over the 25 years following the elimination of quotas, global T&C trade levels will increase by 5 per cent and 16 per cent respectively. Avisse and Fouquin (2001) also predicted a rise of 10 per cent and 14 per cent in T&C global trade respectively.

[6] Terra (2001) predicts that apparel production of the quota-constrained exporters will, as a whole, increase by almost 20 per cent, while the market shares of non-quota-constrained suppliers (e.g. Mexico as well as African and CBI countries) will shrink. Similarly, Diao and Somwaru (2001) estimate shows that the non-quota-holding developing countries will lose about 20 per cent of their markets.

[7] For example, Spinanger (2003) shows that China will double its T&C exports and account for close to 50 per cent of world exports. MacDonald et al.'s (2004) estimates show an increase of Chinese clothing exports in 2005 by 7 per cent and in 2014 by 16 per cent. Similarly, India was also expected to increase its exports by 5 per cent and 14 per cent in 2005 and 2014 respectively. Nordås (2004), on the other hand, predicted that both India and China would almost double their market shares in clothing imports to the EU (to 9 per cent and 29 per cent respectively) and would increase by three- to four-fold in their market shares in clothing imports to the US (to 15 per cent and 50 per cent, respectively).

Although several years have elapsed since the long-awaited removal of the quotas on T&C, there is scarcity of *ex post* analysis of the actual impact on the patterns of trade flows. The few existing studies rely on data covering only the first 1–2 post-quota years. Adhikari and Yamamoto (2007) and Curran (2008) provide some descriptive evidence on the impact of quota removal on T&C exports to the major world markets based only on the first post-quota-year data. Harrigan and Barrows (2009) examine the impact of quota removal on price and quality upgrading, focusing on the US market. Based on comparison of the last year of the quota period (2004) and the first year of the post-quota period (2005), they observed a sharp decline in the price and quality of T&C imports from QCCs (particularly China) following quota removal.[8] Brambilla et al. (2007) examine the relative performance of China in the US market by each phase of the quota relaxation. They found a surge of Chinese exports to the US market, with a negative impact on most of the other exporter countries. They also reported a large decline in export unit values across all US trading partners. Their analysis of the last phase of quota relaxation is, however, based only on one post-quota year (that is, 2005). Thus far we know little about the medium- to long-term adjustment process of the T&C exporting countries following quota removal.

The aim of this study is to address this gap in the literature. It specifically tests one of the predictions that countries effectively constrained by quota in the major world markets will increase their exports at the expense of non-quota-constrained suppliers. Unlike previous studies, it uses relatively longer panel data covering five pre- and five post-quota years (2000–09) of imports to the two largest world markets, the US and the EU. The focus in this study is the clothing trade, although quota removal also affects the textile trade.[9] The US and EU markets are examined separately as they constitute different lists of quota-constrained nations to their respective markets. The number of EU member countries has been growing through time and reached 27 by 2007, but in this study we focus on the 15 member countries (hereafter EU-15) that were in the union throughout our sample period (2000–09).[10] In 2009, the US and EU-15

[8] They also examined the impact of quota removal on welfare of US consumers and found positive gains due to increasing quantity and reduction in price.

[9] Curran (2008) argues that the two sectors are different in terms of structure and character. The textile industry is relatively capital intensive and developed countries still have comparative advantage, whereas the clothing industry is labor intensive, providing comparative advantage to the low-wage countries. The impact of liberalization is, therefore, likely to be different between these industries.

[10] The EU-15 members are: Austria, Belgium, Denmark, France, Finland, Germany, Greece, Italy, Ireland, Luxemburg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

markets respectively accounted for about 22 per cent and 43.2 per cent of world clothing imports.[11] Over 200 countries have been identified with positive exports to each of these markets in the sample period.

The focus of the empirical analysis is the last phase of quota removal. This is because although the signatory countries agreed to integrate with GATT rules for a specified minimum share of their T&C imports at the start of each phase, little liberalization took place in the first three stages. The US and EU eliminated no more than 7 per cent of the quotas carried over from the MFA during the first three stages. Most products integrated with GATT rules in the first three stages were either not subject to quotas or were subject to non-binding quotas with low utilization rates (Mayer, 2005). In effect the US and EU were left with hundreds of quantitative restrictions covering 44 and 15 exporter countries respectively until the end of December 2004 (see Table A1 in the Appendix). The major impact of quota removal was, therefore, felt in the last stage of liberalization (Harrigan and Barrows, 2009). The collective and country-specific export performance of the QCCs in these markets is evaluated using the difference-in-difference (DD) estimation method.

The remainder of this paper is organized as follows. The next section develops the model and section 3 sets the empirical strategy. Section 4 describes the data. Section 5 provides the main results. Section 6 discusses the extent and likely source of heterogeneity among the QCCs. The last section concludes.

2. The model

The gravity model is the workhorse for empirical studies in international trade. The simplest gravity model states that the volume of trade between two countries is an increasing function of their income and a decreasing function of the distance between them. Although the model is often criticized for lacking theoretical underpinning, several studies have shown that the gravity equation is consistent with varieties of Ricardian and Heckscher–Ohlin models. Anderson (1979) presented a theoretical foundation for the gravity model based on constant elasticity of substitution (CES) preferences and goods that are differentiated by region of origin. Deardorff

[11] When considering the larger EU block (EU-27), its world share of clothing imports in 2009 was 50 per cent.

(1998) derived a gravity equation in the Heckscher–Ohlin model with complete specialization. Eaton and Kortum (2002) developed a gravity equation based on aggregate homogeneous goods.

Here we follow recent studies (among others, Redding and Venables, 2002; Anderson and Wincoop, 2003; 2004; Helpman et al., 2007) to develop one of the trade models based on product differentiation with a CES preference in which the elasticity of substitution between any pairs of products is the same. Consider a number of countries $i = 1, \ldots, M$, producing a range of products. The representative utility function of country j is given by

$$\mathcal{U}_j = \left[\sum_{i=1}^{M} \alpha_i x_{ij}^{(\sigma-1)/\sigma}\right]^{\sigma/(\sigma-1)} \qquad (1)$$

where x_{ij} consumption of country j consumers of goods imported from country i and α_i is country-of-origin weight applied when aggregating. The parameter σ is the elasticity of substitution between products.

The optimal import demand of country j can be obtained by maximizing the CES component of utility function subject to the budget constraint, $\sum p_{ij} x_{ij} = y_j$, where y_j is country j's total expenditure on the imported product x, and p_{ij} is the price charged by exporter from country i for exports to j.

$$x_{ij} = p_{ij}^{-\sigma} y_j P_j^{\sigma-1} \qquad (2)$$

P_j is the composite price index for importer j defined over the prices of individual varieties produced in i, sold in j and given by

$$P_j = \left[\sum_{i=1}^{M} \alpha_i p_{ij}^{1-\sigma}\right]^{1/1-\sigma} \qquad (3)$$

Now we return to the producer characteristics. Let us assume perfect competition and constant returns to scale; thus the producer price will be equal to marginal cost in equilibrium.[12] The price charged by producer of country i for the domestic market is $p_i = c_i\alpha$, where c_i is

[12] These results hold even if we assume monopolistic competition whereby the price equation is given as $p_i = (c_i\alpha)/\mu$; where μ reflects the standard markup parameter (see Helpman et al., 2008).

country-specific production costs and α is the index of the inverse of labour productivity capturing the realization of technology in good x.[13] But when selling abroad the exporters from country i incur additional trade costs. Thus the landed (c.i.f) price of the export product from exporter i in country j becomes $p_{ij} = p_i t_{ij}$, where t_{ij} is equal to one plus the tax equivalent of trade barriers.[14]

If we assume that consumers in the importing country j have similar preferences for a particular good irrespective of their country of origin and always buy from the cheapest source, then the probability of shipment from country i is lowered by the production cost ($c_i\alpha$) and trade cost (t_{ij}) of getting the good to country j, relative to the average production cost and trade cost of shipping from all other destinations (Anderson and Wincoop, 2004). We assume multiplicative form and decompose the trade costs into three major components: tariff, transport costs and quotas, and redefine the c.i.f price as follows:

$$\mathrm{p_{ij}} = \mathrm{p_i}\left(1 + \tau_{\mathrm{ij}}\right)\left(1 + \omega_{\mathrm{ij}}\right)\left(1 + \eta_{\mathrm{ij}}\right) \qquad (4)$$

where τ_{ij} is the tariff rate, ω_{ij} is the tariff-equivalent freight cost, and η_{ij} is tariff-equivalent quantitative restraints, all referring to imports from country i to country j.

The tariffs and transport costs are obviously added to the import price and reduce demand, thus reducing imports. Under competitive condition the quota is equivalent to a specific tariff (Falvey, 1979); thus it can have the same impact. If country j imposes binding quotas on the quantity of specific product imported from country i, then a smaller quantity of that product is imported. The excess demand pushes up the domestic price in the importing country, and thus creates a wedge between average price and quota-driven price.

Substituting equation (4) into (2) and taking logs gives the following county j's import demand of product x from country i.

$$\ln x_{\mathrm{ij}} = \log \mathrm{y_j} + (\sigma - 1)\ln \mathrm{P_j} - \sigma \log \mathrm{p_i} - \sigma \ln(1 + \tau_{\mathrm{ij}}) - \sigma \ln(1 + \omega_{\mathrm{ij}}) - \sigma \ln(1 + \eta_{\mathrm{ij}}) \qquad (5)$$

[13] One interpretation of c_i is the prevailing average wage in the country i exogenous to each firm but endogenous to the country.

[14] It is quite common in the literature to use the iceberg assumption to represent the variable trade barriers such as tariffs and transport costs that shipping more than one unit of output is required for one unit to arrive at its destination. Normalizing t_{ij} to one measures zero trade barriers.

This is equivalent to what is often derived from the gravity equations of bilateral trade except for the two prices: the importer price index P_j and the exporter fob price p_i (Anderson and Wincoop, 2003). The standard practice in the empirical literature is to handle these two prices respectively as importing and exporting country fixed effects (e.g. Francois and Manchin, 2007; Helpman et al., 2008). A further reduced form is obtained when the income of the importing country, y_j, is similarly included in the country fixed effect.

$$\ln x_{ij} = D_j + D_i - \sigma \ln(1 + \tau_{ij}) - \sigma \ln(1 + \omega_{ij}) - \sigma \ln(1 + \eta_{ij}) \qquad (6)$$

where $D_j = \ln y_j + (\sigma - 1)\ln P_j$ is the importer fixed effect and $D_i = -\sigma \ln p_i$ is the exporter country fixed effect.

This equation enables us to focus on the trade barriers as the country dummy variables subsume a range of country-specific effects such as income level, fob price, country size and distance.

The above equation also has intuitive implications for the impact of quota imposition or elimination on the import sourcing of the quota-imposing country, which is our main interest in this study. The imposition of quota has at least two impacts on the sourcing of imports.[15] First, the quantities imported from exporters subject to a binding quota will be strictly lower. Second, there will be at least as many, and possibly more, countries exporting to the quota-imposing importer, and thus fragmentation of suppliers. Removing quotas should then reverse the fragmentation process and lead to concentration of import sourcing. Hence, countries effectively constrained by quotas should increase their exports at the expense of quota-free supplier countries.

3. Identification strategy

Equation (6) defines import demand as a function of trade costs plus country fixed effects. The tariff variable is observable and we use applied tariff rate τ_{it} by the importer on products

[15] Quotas could also lead to quality upgrading, which refers to either a shift in demand towards higher-priced import varieties (i.e. change in product mix), or to the addition of improved characteristics to each variety (Feenstra, 1995).

imported from country i at time t. International transport cost is also observable and we use the share of freight cost in total import value, ω_{it}, which is equivalent to the ad valorem tariff rate. The price wedge due to quota (η_{it}) is not observed but proxied here by a dummy, QCC_i, indicating if country exporter i was subject to quotas in the importing country in the given period. As the import equation is separately estimated for each of the two major world clothing markets, the US and EU, there is no need to include importer country fixed effects. On the other hand, since we are using panel data of apparel imports from over 200 countries for the period 2000–09, which are disaggregated at the 4-digit level, we introduce time and product fixed effects in addition to exporter fixed effects. The time effect enables us to control for other macro movements on either side. To reflect these we reformulate equation (6) as follows:

$$lnx_{ict}^{j} = \beta_0 + D_i + c_i + \lambda_t + \beta_1 lnT_{it} + \beta_2 lnf_{it} + \beta_3 QCC_i + \epsilon_{ict} \quad (7)$$

where lnx_{ict}^{j} denotes the log of volume of clothing imports of product type c into market j from exporter country i in period t; T_{it} is one plus ad valorem tariff rate ($1 + \tau_{it}$); f_{it} is one plus tariff-equivalent transport cost ($1 + \omega_{it}$); QCC a dummy for quota-constrained country, D_i, c_i and λ_t are respectively country (exporter), product, and year fixed effects; and ϵ_{ict} is an idiosyncratic error term.

The coefficients β_1 and β_2 measure the elasticity of imports respectively with regard to tariff and transport cost barriers. The main focus of this study is to examine the response of the QCCs to the total phasing out of quotas by the end of 2004. To capture this we replace the *QCC* dummy with an interactive term of *QCC* and a post-quota-period dummy (*PQP*).[16] This interactive term, here denoted as *QCC* × *PQP*, switches from zero to one for all QCCs starting from 2005.

$$lnx_{ict}^{j} = \beta_0 + D_i + c_i + \lambda_t + \beta_1 lnT_{ict} + \beta_2 lnf_{it} + \beta_3 (QCC \times PQP)_i + \epsilon_{ipt} \quad (8)$$

[16] One may keep both the uninteracted terms (*PQP* and *QCC*) in the equation along with the interaction term (*QCC* × *PQP*). But in the presence of the interaction term the main effect of primary factors, while it may sometimes provide a useful qualitative synthesis, is not relevant for detailed interpretation (González and Cox, 2007). In the present context *PQP* could be interpreted as the possible aggregate factor that would cause changes in exports in the absence of policy change, with *QCC* as the difference between treatment and control group prior to policy change. Moreover, the inclusion of these uninteracted terms does not make any difference to the coefficients of the other variables.

The coefficient of the interaction term (β_3) now measures the size of the impact of quota removal on the QCCs. This coefficient is identified by difference-in-difference (DD) variation, i.e. how exports from the QCCs (the treatment group) changed after 2005 in contrast to exports from quota-free and/or preferred countries (the control group).

$$\mathrm{DD} = (x^{\mathrm{QCC}}_{\mathrm{ict}>2004} - x^{\mathrm{QCC}}_{\mathrm{ict}\leq 2004}) - (x^{\mathrm{NQCC}}_{\mathrm{ict}>2004} - x^{\mathrm{NQCC}}_{\mathrm{ict}\leq 2004}) \qquad (9)$$

The quota-constraint dummy, *QCC*, may not indicate restrictiveness of the quota as the quota limits were not uniform across the QCCs and did not bind all of them equally. Fill rate provides a useful indication of quota restrictiveness. We thus differentiate QCCs under binding quotas from those less restricted QCCs based on fill rate of the quota limit applied for each MFA category. The relative performance of the effectively constrained countries by the quota limit (high fill rate) could similarly be identified using the DD method.

$$\mathrm{DD} = (x^{\mathrm{Highfill}}_{\mathrm{ict}>2004} - x^{\mathrm{Highfill}}_{\mathrm{ict}\leq 2004}) - (x^{\mathrm{ROW}}_{\mathrm{ict}>2004} - x^{\mathrm{ROW}}_{\mathrm{ict}\leq 2004}) \qquad (9')$$

where *Highfill* denotes QCCs with high fill rate and *ROW* represents the rest of the world including those QCCs with lower fill rate in 2004.

The DD method has become increasingly popular in estimating the effect of policy intervention (e.g. Friedberg, 1998; Wolfers, 2006; Bertrand et al., 2004; Wooldridge, 2002; Athey and Imbens, 2006). A number of studies focusing on trade policy impact have also applied the DD estimation (e.g. Collier and Venables, 2007; Harrigan and Barrows, 2009; Frazer and Biesebroeck, 2010). There are, however, statistical and estimation issues in applying it, some of which are discussed below.

First, Wolfers (2006) argues that a specification of treatment with only a single unilateral dummy (identifying before and after) cannot fully capture the dynamics, i.e. the adjustment process following the intervention, and suggests the use of full post-intervention group of year dummies. Introducing the full post-treatment interaction term might be more informative about the dynamics of response. Moreover, it is also possible that the gains from treatment depend not only on observed and unobserved heterogeneity but also on time (Wooldridge, 2005). In light of this we also examine the year-by-year difference in response in the post-quota period for the QCCs using the following specification:

$$\ln x_{ict}^{j} = \beta_0 + D_i + c_i + \lambda_t + \beta_1 \ln T_{ict} + \beta_2 \ln f_{it} + \sum_{k \geq 2005} \beta_k \, (QCC \times PQP)_{it} + \epsilon_{ipt} \quad (10)$$

Second, unbiasedness of the DD estimator requires that the policy change not be systematically related to other unobserved factors that affect the outcome. The pooled ordinary least square (OLS) is biased and inconsistent if the unobserved effect is correlated with the explanatory variable including the intervention variable. The fixed effect (FE) estimator allows unobserved heterogeneity to be correlated with other explanatory variables in the model. One criticism of the FE estimator is that if policy changes as a reaction to past outcome, then the critical assumption in the FE estimator that the idiosyncratic error term is uncorrelated with the unobserved effect might be violated. In our case, however, the exogeneity assumption between unobserved effect and idiosyncratic errors is not unreasonable. This is because the policy intervention (elimination of quota) was fully anticipated and statistically exogenous, and continues to be effective for all countries (Harrigan and Barrows, 2009).[17] We thus use the FE estimation method, which is widely applied in panel data models and particularly in the DD context.

Third, Bertrand et al. (2004) argue that DD studies often ignore the presence of autocorrelation in the outcome as well as treatment; hence the resulting inconsistency of standard errors. They pointed out three factors that make serial correlation an especially important issue in the DD context. First, DD estimation usually relies on fairly long time series. Second, the most commonly used dependent variables (outcomes) in the DD model are typically positively highly correlated. Third, the treatment variable in the DD model changes very little within a state/country over time. They suggest three solutions to solve the serial correlation problem.[18] Here, we adopt one of them, that is, allowing for an arbitrary covariance structure over time within each country and product given that we have a sufficient number of exporters (over 200

[17] The exception here is a reinstitution of quotas in the summer of 2005 on some Chinese imports in both the US and the EU as a safeguard measure based on prior agreement when China joined the World Trade Organization (WTO) in 2001.

[18] We have also applied their second suggestion, i.e. removing the time-series dimension by aggregating the data into two periods, pre- and post-intervention, as part of the robustness check exercises.

countries each containing up to 44 categories of products).[19] Clustering the panel variable produces an estimator of variance component estimation (VCE) that is robust not only to within-panel (serial) correlation but also to cross-sectional heteroskedasticity that is asymptotically equivalent to that proposed by Arellano (1987).[20]

Finally, there is an emerging concern in the empirical trade literature that excluding zero trade observations from the trade flow estimation is likely to produce biased estimates (e.g. Silva and Tenreyro, 2006; Baldwin and Harrigan, 2007; Eaton and Kortum, 2002). The interest of this study is in the response at the intensive margin (increase/decrease in exports) and not at the extensive margin (starting new exports) as quotas are imposed on positive exports. We thus argue that the exclusion of zero observations is less likely to have an impact on the coefficient of our main variable of interest, i.e. the response of QCCs to quota removal. But for the completeness of the empirical exercise we provide estimation results that include zero trade observations as part of the robustness check.

4. Description of data source and construction of variables

Clothing imports, the dependent variable in our model, is measured in terms of quantity (in 100 kg).[21] Volume is obviously preferable to value when analysing the impact of removal of quantitative restrictions. Nevertheless value-based estimations are also provided at a later stage to show if the main results are robust to changes in measurement imports from quantity to value. We use the mirror import data based on import records of the US and the EU-15 to their respective markets.[22] The data for the US are obtained from the United States International Trade Commission (USITC)[23] and for the EU-15 from EUROSTAT.[24] Clothing imports are disaggregated at the 4-digit level, containing 44 categories of products from 6110 to 6310. The data cover a 10-year panel (2000–09), five years for each pre- and post-quota period, and consist

[19] In our case, the outcome variable (export) exhibits state dependence and strong serial correlation over time. However, we found no evidence of unit root, suggesting that the data are stationary.

[20] Heteroskedasticity is another concern in a large data set that includes heterogeneous units (countries) such as in our case. Silva and Tenreyro (2006) argue that heteroskedasticity is quantitatively and qualitatively important in the gravity equation, even when controlling for fixed effects.

[21] It is defined as the weight of the commodity without any packing. A standard conversion factor is used to convert each clothing product to kg.

[22] Imports are usually recorded more accurately than exports because imports generate revenue and exports do not.

[23] Source: http://dataweb.usitc.gov/scripts/user_set.asp.

[24] Source: http://epp.eurostat.ec.europa.eu/portal/page/portal/external_trade/data/database.

of 207 and 202 countries with positive exports respectively into the EU-15 and US markets. The EU-15 is taken as one market as it applies the same quota and tariff policy on T&C imports. Imports to this market from each country are thus aggregated at the EU-15 level. The focus of the main analysis is the extra-EU-15 imports, but estimation results that also include intra-EU-15 imports are discussed as part of the robustness checks.

The tariff data on clothing imports to both the US and the EU-15 were obtained from the UN/World Bank WITS system (World Integrated Trade Solution). The tariff rate is a weighted average calculated at the 4-digit-level HS code. Transport cost reflects the cross-border delivery cost of goods and is measured in ad valorem terms, that is, the cost of shipping relative to the value of goods. The share of freight cost in total imports for the US market was obtained from the World Trade Indicator (World Bank).[25] Due to absence of information on transport costs for the EU-15, we use a broader measure that includes not only the freight costs but also additional direct and indirect costs associated with administration and communication. This is taken from ESCAP-World Bank Trade Cost database and is referred to as non-tariff trade cost. The non-tariff trade cost is available on a bilateral country basis and we generated average delivery cost from each country to the EU-15.[26] The drawback with this variable and source is the presence of missing information for a large number of countries and lack of direct comparability with the US, which is based on freight costs. In both the US and the EU-15 cases we use two data points of transport costs representing the pre- and post-quota-period averages.

Information on QCCs for the US market is taken from Brambilla et al. (2010).[27] This data set provides a list of countries under quota limits in the US T&C market and fill rates for each MFA category under quotas. Following these authors, we focus on the 'specific limit' quotas, which are the most restrictive quotas applied, although there are other quota classifications mainly serving as a watch list. Given the scope of this study, we consider only countries with quota constraints on their clothing exports. In 2000, the number of countries under quota limits to the US market was 45. In 2004, the number of QCCs declined to 44 when Kenya and Mauritius were dropped from the list and Belarus was added.

[25] This indicator reflects the US total freight charges of shipping and insurance by all modes of transportation divided by the net value of goods imports at the origin of US ports.
[26] ESCAP stands for Economic and Social Commission for Asia and Pacific. The data can be found at http://www.unescap.org/tid/artnet/trade-costs.asp. Duval and Utoktham (2011) give further explanation of the construction of the variable.
[27] Source: http://www.som.yale.edu/faculty/pks4/sub_international.htm.

The quota-limit data for the EU were obtained from SIGL (Système Intégré de Gestion de Licenses).[28] This data set classifies countries under surveillance and quota. Since the surveillance is not binding, we take only countries with effective quota limits in 2004. Serbia & Montenegro, one of the QCCs in the EU market, is excluded from the empirical analysis due to changes in the political geography of the country in this period and resulting mismatch with the import data. This gives 15 countries under quota limits in the EU apparel market in 2004.

As a benchmark we consider a country as quota constrained, denoted *AllQCC*, if it was under 'specific limit' of quotas in one or more of the MFA category products in 2004, a year prior to the quota removal (see Table A1 for the full list). But this may not represent the restrictiveness of the quota. We then constructed a measure of effectiveness of the quota constraint based on fill rate. The data sets for both the US and the EU-15 indicated above provide information of fill rate based on MFA category. The data made available for us regarding imports are, however, based on the HS code. The ideal measure of fill rate would be at product level but we were unable to match the two data sets at product level due to overlaps in the product categories. We thus rely on country-level aggregation to define high-fill-rate countries and consider two alternative measures.

First, we calculated aggregate fill rate as the ratio of imports of all MFA category products under quota limits to the adjusted base quota for each country in 2004. A fill rate of 90 per cent and above is usually used to define quota restrictiveness (e.g. Harrigan and Barrows, 2009; Brambilla et al., 2010). But when defining binding quota as aggregate fill rate greater than 90 per cent in 2004, we find only three countries (China, Vietnam and Belarus) in the US and only one country (China) in the EU clothing market satisfying this limit. This is partly because the Agreement on T&C imposed a growth rate of quota in each phase to progressively enlarge the remaining quota and as a result the number of products/countries with 90 per cent and over fill rate declined through time. We thus considered a less restrictive definition, i.e. 80 per cent or more aggregate average fill rate as the binding quota to define high-fill-rate countries (hereafter *Highfill_Ag80*).[29] Under this category there are nine and four countries respectively in the US and the EU-15 clothing market.

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[28] The web source is http://trade.ec.europa.eu/sigl/querytextiles.htm.

[29] We expected the gains to be higher when defining the conservatively binding quota as 90 per cent and above fill rate than as 80 per cent and above fill rate, which is what we found. Had the 80 per cent fill rate shown a negative or indeterminate impact, then the results of the 90 per cent and above fill rate would have been worth discussing here.

<Table 1 around here>

Second, as an alternative measure of quota restrictiveness we also consider the fraction of MFA category products under quota limit that exceeded 80 per cent fill rate in 2004. We generated a dummy consisting of countries with above-mean fraction of MFA category under quota limit with fill rate 80 per cent and greater (hereafter *Highfill_Fr80*). This is calculated as the share of MFA categories of the exporting country with 80 per cent and greater fill rate in relation to the total number of MFA categories for which the country faces quota limits in the given market (US/EU-15). The average of this ratio for the US market is 0.208 and for the EU-15 it is 0.285. There are respectively 17 and 7 QCCs that exceed these averages.

In the empirical analysis below, we make separate estimations for each of the three alternative quota constraint indicators, whereby each of them is interacted with the post-quota-period dummy (*PQP*) to capture post-quota performance. These interaction terms, here denoted as *AllQCC* × *PQP*, *Highfill_Ag80* × *PQP* and *Highfill_Fr80* × *PQP*, measure the response of respectively all QCCs, aggregate-average-based high-fill-rate, and fraction-based high-fill-rate countries to the removal of quota on clothing imports to the major world markets (in our case the US and the EU-15). Table 1 gives a definition and some summary statistics of the main variables used in the empirical analysis.

5. Results

5.1 Main results

The US market

Table 2 reports the estimation results for the US clothing market. The top panel (panel A) gives results of the post-quota years' average performance, while the bottom panel (panel B) gives the full post-quota group of years' estimation. All the estimations control for year, country and product fixed effects, and the standard errors are robust to cross-sectional heteroskedasticity and within-panel (serial) correlations. The first three columns use *AllQCC*s, which consists of all 44 countries with at least one apparel product under quota in the US market in 2004 as the treatment group. The control group consists of the non-quota-constrained countries or simply the rest of the world (ROW).

Column 1 reports the benchmark estimation results whereby the only main variable is the interaction term (*AllQCC* × *PQP*). The coefficient of this interaction term (in the top panel) is negative and statistically significant. The year-by-year-based estimation results reported in the bottom panel of the same column also give negative coefficients, of which three out of five post-quota years are statistically significant. Column 2 gives estimation results of the main model, which includes the tariff rates and transport costs each country faces when exporting to the US market. And column 3 reports results when the tariff is entered in quadratic form; it will shortly become clear why this is important. The introduction of the additional variables such as tariff rates and transport cost does not have much effect on the main variable of interest, *AllQCC* × *PQP*.[30] Both columns 2 and 3 give coefficients equal to –0.11, which is only marginally lower than the benchmark result in column 1. The year-by-year estimation results reported in the bottom panel (columns 2 and 3) similarly all show negative coefficients, three of which in each column are statistically significant. This shows that following the removal of quotas, imports of clothing to the US market from an average QCC have fallen by about 11–12 per cent in comparison with the ROW. This appears contrary to the notion that the QCCs would increase their exports following removal of quotas. But as will shortly become clear, not all QCCs were effectively constrained by the quotas imposed on them.

<Table 2 around here>

As expected, transport cost yields a negative and highly significant coefficient. This coefficient measures the elasticity of clothing trade flow to the US with respect to transport cost. Its magnitude, at –3.82, suggests the quantitative importance of the impact of transport cost on trade flow. This is broadly consistent with previous studies; for example Limão and Venables (2001) find estimates of the elasticity of trade with respect to freight cost in the range –2 to –3. In contrast, the tariff variable is statistically less significant. One possible explanation for this is

[30] Other estimation results reported for high-fill-rate countries (see cols 4–7) give similar coefficients in the presence and absence of tariff and transport cost variables. This is, indeed, not unexpected given that country, year and product fixed effects are controlled for in all estimations.

that, unlike transport costs, tariff rates have been steadily reduced through trade negotiations, and thus are a less important barrier to trade (Hummels, 2007).

However, US tariff rates (and EU rates as well) were not reduced equally for all products and partner countries. There remains a large variation in tariff rates on clothing imports. While several products/countries enjoy free duty, others continue to pay higher rates of up to 28 per cent. In light of this, in column 3 we add squared tariff rates to the baseline model. The first level and second order of the tariff rates respectively give positive and negative coefficients. Both are individually statistically significant and further tests show that they also have a joint significant effect on imports. This implies an inverted-U-shaped relation between tariff rates and imports. The relation between tariff rates and imports turns negative beyond a certain level, in our calculation tariff rates of 11 per cent and above. Henceforth, we continue with quadratic-form specification.

Quotas did not bind all countries equally. As indicated in the data section, we use two alternative indicators to measure effectiveness of quota constraint at the country level. In columns 4–5 we define countries with an above-average fraction of MFA category products under quota exceeding 80 per cent fill rate in 2004 as high fill (*Highfill_Fr80*), thus as the treatment group. This criterion reduces the number of QCCs in the treatment group from 44 to 17. The control group is now the ROW, including those QCCs with a below-average fraction of MFA category with 80 per cent fill rate. The interaction of the high-fill-rate group and post-quota period *(Highfill_Fr80 × PQP)* gives a positive and highly significant coefficient. The results are very similar whether tariff and transport costs are introduced or not; thus the discussion below focuses on the extended model. The estimates show that following quota removal the high-fill-rate QCCs increased their volume of clothing exports to the US market by about 45 per cent in contrast to the ROW.

In columns 6–7 we use the aggregate-average-based high-fill-rate QCCs (*Highfill_Ag80*) as the treatment group. This category further narrows the number of effectively constrained countries to just nine. The control group is the ROW, including those QCCs with aggregate fill rate less than 80 per cent. The interaction term, *Highfill_Ag80 × PQP*, gives not only a positive and highly significant, but also larger-magnitude, coefficient. According to the estimates, the group of countries with 80 per cent and greater aggregate fill rate increased their volume of clothing exports to the US market by an average of 105 per cent in the post-quota period, in contrast to the ROW. This is more than double compared with what was obtained from the fraction-based high-fill-rate estimation in columns 4–5. The year-by-year coefficients of the countries with high-fill-rate based on either fraction or aggregate averages are not only positive and significant but also increase in magnitude with time (see the bottom panel, cols 4–5). For example, the QCCs with high aggregate average fill rate (*Highfill_Ag80*) increased their exports by about 72.5 per cent the year after quota removal (2005) and by 142.6 per cent in the fifth year (2009), in comparison with the ROW.

The EU-15 market

Table 3 reports the estimation results for the EU-15 market based on extra-EU-15 clothing imports. This table has the same structure as Table 2 above, which reports US market results. The treatment group in the first three columns consists of all QCCs (*AllQCC*), columns 4–5 fraction-based high-fill-rate countries (*Highfill_Fr80*), and columns 6–7 aggregate-average-based high-fill-rate countries (*Highfill_Ag80*). Similarly, panel A gives the results of the average post-quota impact and panel B the year-to-year post-quota adjustment. All estimations control for country, year and product fixed effects, and the standard errors are robust to cross-sectional heteroskedasticity and within-panel (serial) correlations.

Similar to the US market, transport cost is negatively associated with clothing trade flow to the EU-15. The elasticity of imports with respect to transport cost is about –1.1, which is lower than in the US market case. It is worth recalling here that the transport cost variables for the US and the EU are not directly comparable as they were taken from different sources, using different methods of calculation. As in the US market case, we find an inverted-U-shaped relationship between imports and tariff rates in the EU-15. The tariff rate at which the relationship between tariff and trade turns negative is at about 5.2 per cent. This is lower than in the US case reported above and reflects the difference in the range of tariff rates applied in these two markets. The maximum tariff rate for clothing imports in the EU is only 12 per cent, which is less than half the maximum rate in the US.

<Table 3 around here>

We now return to the main variable of interest and start with the estimation whereby the treatment group is *AllQCC*, constituting 15 countries. In the benchmark specification (col. 1 in Table 3), the *AllQCC* × *PQP* coefficient takes a negative sign but is statistically insignificant. The year-by-year coefficients in panel B have mixed signs and none of them, except one, is significant. The introduction of tariff rates and transport costs, in columns 2–3, makes no qualitative difference to the *AllQCC* × *PQP* coefficient, although it also reduces the number of observations by nearly 8000 due to missing information on these variables. The coefficient remains insignificant despite change of sign. The implication is that, compared to the ROW, the average country in the QCC group neither increased nor reduced its clothing exports to the EU-15 market following quota removal.

In columns 4–5 we use the fraction-based high-fill-rate countries, *Highfill_Fr80*, as the treatment group. Both columns give a positive and significant coefficient in the range of 0.22 to 0.25. In columns 6–7 we provide estimation results of the high-fill-rate countries based on average aggregate fill rate of 80 per cent and above (*Highfill_Ag80*). Here again we find a positive and statistically significant coefficient (0.22). For both measures of the high fill rate the year-by-year estimation results in panel B also give positive and mostly significant coefficients. The implication is that, unlike the 'all QCCs' category, the high-fill-rate countries in the EU-15 market responded positively to the removal of quotas and increased their exports by about 22–25 per cent in comparison with the ROW.

The magnitude of response to the removal of quotas by the high-fill-rate QCCs in the EU-15 market is much smaller compared with what we find for the US market. For example, based on the aggregate average, high-fill-rate countries increased the volume of their clothing exports by 105 per cent to the US market and only by 22 per cent to the EU-15 market in comparison with the ROW. One possible explanation for this difference is that the number of 'all QCCs', as well as effectively quota-constrained countries in the EU-15, is smaller than in the US. Their market share in the EU-15 is also correspondingly lower than in the US clothing market.[31] This shows the presence of other major players in the EU-15 clothing market, which were not subjected to quota limitation or continued to enjoy preferential treatment.

[31] For example, in 2004 the QCCs accounted for 63 per cent of US clothing imports, but only 30 per cent of total EU-15 and 43 per cent of extra-EU-15 clothing imports.

5.2 Some robustness checks

Below we perform a sensitivity analysis on the main results. Table 4 reports a variety of robustness check results for the US market (panel A) and the EU-15 market (panel B). As before, in each market we estimate three alternative categories of the QCCs: all QCCs (row 1), fraction-based high-fill-rate countries (row 2) and aggregate-average-based high-fill-rate countries (row 3). All estimations, except the last column, control for tariff and transport costs in addition to country, year and product fixed effects. For brevity of presentation only the coefficients of the three alternative categories of QCCs are reported.

We start the discussion by examining the sensitivity of the main results when changing the control or treatment groups. Column 1 (bottom panel) reports the estimation result for the EU-15 when intra-EU-15 imports are included. The coefficients for all the three quota-constrained indicators are very close to the corresponding coefficients in the main results reported above. That is, the two measures of high fill rate give positive and significant coefficients, while 'all QCCs' remain insignificant. This suggests that our findings for the EU-15 are robust to extending the control group by including intra-EU-15 trade.

<Table 4 around here>

Column 2 gives results when the control group consists of only preferred countries (PRFs) in each of the markets.[32] In the US market case all the alternative indicators give a result qualitatively similar to the main one. The only difference is that the magnitude of all the coefficients increases. The fact that the positive performance of the high-fill-rate (both aggregate- and fraction-based) countries improves further when the control group is only PRFs is not unexpected. The worsening negative performance of the average QCCs when the control group is only PRFs is, however, not easy to explain. The positive performance of the high-fill-rate countries is also further strengthened in the EU-15 market when the control group consists only of PRFs. In fact, the 'all QCCs' category in the EU-15 now also provides a positive and

[32] The preferred countries group for the US clothing market includes those receiving preferential treatment under the AGOA Apparel Act, CBTPA (Caribbean Basin Trade and Partnership Act), ATPDEA (Andean Trade Promotion and Drug Eradication Act) and NAFTA. The preferred countries in the EU-15 market, on the other hand, include beneficiaries of EU-EBA, EU-Mediterranean and new EU members (EU-12) that had favorable access to the EU-15 market even before their accession.

significant coefficient, suggesting that not only high-fill-rate but also all other QCCs have improved their exports in comparison with the PRFs. This is indeed what one would expect given that the primary victims (at least in the short run) of intensified global competition following quota removal are the PRFs, which have been developed their clothing exports under quota protection.

China is increasingly dominating the world clothing market, particularly since its accession to the WTO in 2001. In 2009, China's share in the US and EU-15 clothing markets reached respectively 39.6 per cent and 29.7 per cent, which is almost triple in comparison with 2001. It is also exceptionally dominant among the QCCs, accounting for about 51 per cent and 71 per cent of all the QCCs clothing exports respectively to the US and EU-15 markets. One would thus wonder if the main results above hold when China is excluded from the treatment group in all categories of QCCs. In this spirit, column 3 reports results when China is excluded from the estimation. The US market results remain qualitatively similar to our main results, except for a small decline in the magnitude of the coefficients. This is expected given the importance of China among all alternative categories of QCCs. The importance of China is more visible when looking at the EU-15 results. The 'all QCCs' category has become marginally significant with a negative sign, suggesting that exports to the EU-15 market from an average QCC excluding China actually declined in comparison with the ROW. Moreover, none of the coefficients of the high-fill-rate group is now significant. This means that the positive performance of the high-fill-rate countries in the EU-15 reported in the main specification is driven by China's extraordinary performance. Thus results for the EU-15 are not robust when China is excluded, which is not unexpected given China's enormous share in this market (71 per cent for example in 2009) among the QCCs.

When quotas are imposed, one likely response of the quota-restricted exporter is to increase the quality of the product and demand a higher price. Quota removal is thus expected to reverse this process and lead to quality downgrading. This was observed particularly in the composition of China's exports following quota removal (e.g. Harrigan and Barrows, 2009; Brambilla et al., 2010). If exporters change their product mix from expensive to cheaper products, export quantity might increase following quota removal without actually increasing the value of exports. This means that our estimation, which is based on volume of exports, does not tell us whether indeed the QCCs are also increasing the value of their exports and not only the quantity of cheap products. In light of this, we estimated the import equation in terms of value instead of volume (see column 4). US imports are measured in USD, and EU-15 imports in euros.[33] In both markets we find qualitatively similar results with the main models. The high-fill-rate countries increased not only the volume but also the value of their exports, suggesting that the export performance of the high-fill-rate QCCs in the post-quota period is not driven by increased quantity of cheaper products. The performance of the average QCCs also remains negative and indeterminate respectively in the US and EU-15 markets, which is again similar to the main model.

Country (exporter/importer) income and size have often been included in gravity models of bilateral trade. So far, we have assumed that these are constant and have subsumed them into the country fixed effects. Now we relax this assumption and, thus, include importer GDP per capita, exporter GDP per capita in quadratic form, and exporter population size into the estimation. Column 5 reports results from this specification. As before, to save space, only the coefficients of the alternative quota-constrained indicators are reported, but not the other controls.[34] The introduction of the extra controls into the model does not have much impact on the variables of interest in each market. Each of the QCCs indicators gives similar results to the benchmark one except for small changes in the magnitude of the coefficients of the high fill rates. This means that the coefficients for the EU-15 become a bit larger while those of the US become smaller in comparison with their respective main results.

So far we have tried to address the autocorrelation problem by allowing for an arbitrary covariance structure over time within each country, following the suggestion by Bertrand et al. (2004). These authors have also suggested an alternative method, i.e. removing the time-series dimension by aggregating the data into two periods (pre- and post-intervention). In light of this we estimated aggregated data at two points, i.e. pre- and post-quota periods. The results are reported in column 6 and show that the main results are not sensitive to the time-aggregation of the data and thus are not contaminated by any autocorrelation problem in the time series.

[33] The information on import values and import quantity for each market was obtained from the same source. The value of imports was deflated for price changes using a unit price pattern generated from the same data source.

[34] For both the US and EU-15 markets the exporter per capita income variable gives a positive coefficient at the first level and a negative one in the quadratic, all of which are statistically significant. This inverted-U-shaped relation between clothing exports and exporter per capita income suggests the presence of some threshold in terms of labor cost to stay competitive in the world clothing industry. In both markets, the importer country per capita income gives a negative and significant coefficient. But exporter population is statistically significant in neither of the markets.

Lastly, we address the emerging statistical concern that the exclusion of zero trade observations from the estimations is likely to create bias in the estimates. We assign zero to missing imports (the dependent variable) and create a rectangular data set of 200 or more countries each with 44 types of apparel export products over the 10-year period for both markets. We find a great deal of missing information, particularly on tariffs when imports are not observed. Thus tariff and transport costs are excluded from this estimation. Earlier results suggest that the exclusion of the tariff and transport costs has little effect on the main variable of interest. The model is estimated using censored regression (Tobit) methods. Country, year and product fixed effects are also controlled for and, as before, the standard errors are robust. Results are reported in column 7. The US market results for each of the QCCs categories are consistent with the main specification, and thus not sensitive to zero import values. There are some differences when it comes to the EU-15. The fraction-based high-fill-rate category for the EU-15 continues to give a positive and significant coefficient which is qualitatively similar to the main specification. However, unlike the main result, the aggregate average fill rate becomes less significant while the ‘all QCCs’ indicator becomes statistically significant (with a negative sign). This will be explored further when looking at the country-level QCC performance in section 6.

Overall, the results from the US and EU-15 are qualitatively similar. In both markets the QCCs performed heterogeneously. The QCCs taken together as a group have at best not gained (EU-15 market) and at worst they have even lost (US market) from quota removal. But when refining the QCCs based on high fill rate we find a large increase in their exports following quota removal in both markets. The magnitude of the gains in the US market is higher than in the EU-15 market. A variety of robustness checks shows that these results hold generally.

6. Heterogeneous performance of QCCs

6.1 How heterogeneous are the QCCs?

The discussion so far has been based on estimation results of some form of aggregate categories of QCCs, implicitly assuming that the impact of quota removal would be the same at the sub-group level. The analysis above, however, shows that the impact of quota removal on the QCCs has been mixed. Although the high-fill-rate countries have generally performed positively, the magnitude of their gains depends on how we define the fill rate. In this section we further highlight the extent of heterogeneity in post-quota export performance among the QCCs by estimating equation (8) and disaggregating the QCCs at country level. This estimation provides coefficients of an interaction of country dummy and post-quota period for each QCC, which measures the relative post-quota performance of each QCC in comparison with the ROW. As before, the US and EU-15 markets are estimated separately.

Table A2 in the Appendix provides the QCC-level full estimation results of alternative specifications for the US market. Column I reports the results of the main specification, which controls for tariff and transport costs as well as the country, year and product fixed effects. Column II excludes tariff and transport costs, column III considers zero trade observations, and column IV uses imports values (1000s of USD) instead of volume as dependent variable. There is not much difference between the results of these alternative specifications except for a couple of countries at the margin. The discussion below, therefore, elaborates on the main result in column I with the support of Figure 1, which sketches the estimated coefficients of each QCC. The shaded bars represent significant coefficients at the 10 per cent or higher level.

The figure shows a large disparity of post-quota export performance among the QCCs. Based on the sign and significance of the estimated coefficients, we classified the QCCs into three categories (gainers, indeterminates and losers). The group of gainers here defined as QCCs with a positive and significant coefficient comprises 13 out of 44 QCCs. There is also a large difference in performance even within this group, ranging from 28.2 per cent (Colombia) to 248.4 per cent (Vietnam) of average growth in comparison with the ROW attributed to the removal of quotas. Nine out of the 13 gainers are from Southern and Eastern Asia, all of which except Malaysia are among the top eight performers.

<Figure 1 around here>

The indeterminate group refers to QCCs with insignificant and mostly small coefficients. This group consists of 11 out of 44 QCCs, which are mixed from several continents. The third group is the group of losers here defined as QCCs with a negative and significant coefficient. This group consists of 20 out of 44 QCCs and includes four countries from the Middle East, five from Eastern Asia, five from Europe (mainly East), three from Latin America and two others.

Similarly, there is a large difference within the losers' group in the magnitude of their loss in the post-quota period. The six that have lost most in the post-quota period are Russia, Qatar, Jamaica, Kuwait, Macedonia and Oman in descending order.

Figure 2 similarly summarizes the results of each QCC in the EU-15 market based on the main specification. The full estimation results of the main model and other alternative specifications for the EU-15 are reported in Table A3 in the Appendix. The number of QCCs in the EU-15 market was only 15 (all from Asia except Belarus). Due to missing information on tariffs, North Korea does not appear in the main specification. Similarly to the US case, we find a high disparity of performance among the QCCs in the EU-15 market. Again we categorized the QCCs into three groups based on the sign and significance of the estimated coefficients. The group of gainers, i.e. with a positive and significant coefficient, consists of four countries – China, Vietnam, India and Pakistan respectively. According to the estimates these countries increased their exports in the post-quota period between 43.9 per cent (Pakistan) and 123.8 per cent (China), in contrast to the ROW. All these gainers are also among the top performers in the US market.

<Figure 2 around here>

The loser group (i.e. countries with a negative and significant coefficient) also consists of four countries – Macau, South Korea, Belarus and Singapore respectively. All these countries are also among the loser countries in the US market. The remaining six countries belong to the indeterminate category with less significant coefficients. The alternative specifications reported in Table A3 (cols II–V) give results similar to the main model except for a couple of countries at the margin, which change status. The four gainers and four loser countries remained the same across the specifications. A few countries have, however, had changes of status, for example the Philippines, Taiwan and North Korea, from the indeterminate to the loser group, while Thailand has moved from the indeterminate to the gainers' group in some of the other specifications.

In sum, estimations for both the US and EU-15 markets show that not all QCC countries gain in the aftermath of quota removal. A few countries have shown extraordinary performance, increasing their clothing exports, while several others have seen a substantial decline. The implication is that the few beneficiaries have displaced not only other non-quota countries but also the majority of the QCCs. There is some similarity between the US and EU-15 markets regarding the top and bottom performer countries, although the number of QCCs in the latter market is smaller than in the former. The high-performer QCCs are mostly from Eastern and Southern Asia, while the losers are a mix of different regions, including the Middle East, Eastern Asia, Eastern Europe and Latin America.

6.2 Explaining the heterogeneous performance of QCCs

In the previous section we documented that the impact of quota removal on the QCCs is highly heterogeneous. We have also shown some evidence that the more binding the quota, the more likely it was that the country would increase its exports after its removal. However, the fill rate is not the sole source of differential performance. Although several gainers and losers were respectively among the high and low quota fill rates in the year before quota removal, there are also examples that show the contrary. Other factors might also be responsible for the heterogeneous post-quota export performance. In this section we shed some light on this by formally testing the sources of country-specific differences in clothing export performance among the QCCs in the post-quota period. Here we focus on the US market, which consists of 44 QCCs. The reason is that the QCCs in the EU-15 market are not only too few (i.e. 15) to make meaningful estimation, but all the QCCs in the EU market except one (North Korea) are also on the list of QCCs in the US clothing market. And we know that most of the QCCs perform similarly across the two markets.

The following equation specifies the model we would like to estimate:

$$Exp\_pf_{it} = \alpha_0 + \lambda_t + \alpha_1 fillr_{2004} + \alpha_2 \ln(Lab\_cost)_{it} + +\alpha_3 lnf_{it} + \alpha_4 lnT_{it} + \alpha_5 RCAT_{it} + \alpha_6 \ln(pop)_{it} + u_{it} \qquad (11)$$

The subscript *it* (country/year) represents continuous variables that may differ by year for each country, while those without subscripts are constant across the period and u_{it} is an idiosyncratic error term. The dependent variable (*Exp_pf*) is the post-quota performance of each QCC, measured by the country-level coefficients obtained from the fixed effect (country, year, and product) estimation of the benchmark model, i.e. without tariff and transport costs.

Excluding the tariff and transport costs in the first stage allows us to introduce them into the second-stage estimation. It is worth recalling here that the exclusion of the tariff and transport cost does not have much effect on the estimates of main variable of interest. The QCCs are fewer in number (maximum 44 in the US market), while our model introduces a relatively long list of explanatory variables, which may lead to loss of degree of freedom. In order to address this concern we use coefficients of the QCCs obtained from the estimation of the full post-quota group of years' dummies. This gives us five post-quota-year coefficients for each QCC and increases the overall observations (country/year) from 44 to 220.

The definition of the explanatory variables and justification for their inclusion in the model is discussed briefly as follows. The fill rate ($fillr_{2004}$) is defined as the aggregate fill rate in 2004 weighted by the number of MFA categories under quota limit. It captures the effectiveness of the quota limit and is expected to be positively related with export performance in the post-quota period. The second explanatory variable, ln(*Lab_cost*), is labour cost of the exporting country (in logarithm form). The justification is that competition in the global apparel market is expected to intensify in the post-quota period as a result of liberalization. The apparel industry is labour intensive and labour cost should remain a key factor differentiating the relative export performance of the countries. We use average monthly wage rate, which was obtained from the ILO database, the Key Indicators of Labour Market (KILM), and converted to USD using the nominal exchange rate from the IMF. The problem with the ILO database on wages is that it is not complete. In our sample of 44 QCCs, for instance, there is total absence of information for nine countries and missing years for some others. We partially corrected the latter problem by taking average wage over the given period (2005–09) instead of using the time dimension. But this does not cover the nine countries with total absence of information on wages. In the face of this problem, we use GDP per capita (in logs) as an alternative measure of level of country labour cost. This may not be a perfect measure of labour cost but on the positive side we find very high correlation (0.91) between the average wage rate and GDP per capita in our data.

Transport costs and tariff variables are also included for the reasons cited in the Model section above. As before, $\ln f$ is defined as log of one plus average freight cost rates to the US and $\ln T$ as the log of one plus average ad valorem tariff rate. The existence of strong domestic input supply, particularly textiles, helps to reduce transport costs and time delay caused by imports and thus gives an advantage to apparel exports. To capture these effects we include a measure of revealed comparative advantage (RCA) in textile industries, here denoted as *RCA_Txt*. The RCA data were obtained from WITS and defined as the share of textiles in total exports of each country relative to the share of the textiles in world exports. We have also controlled country size by introducing ln(*pop*), defined as the log of population of the exporting country. Data on population and GDP were obtained from UN Statistics Division (UNSD).[35]

Table 5 reports the estimation results. All are estimated using OLS with year fixed effect, and standard errors are adjusted for within-panel correlation. Columns 1 and 2 give the benchmark results respectively based on GDP per capita and average wage rate to represent country labour cost. In Columns 3 and 4 we use the inverse of the standard deviation of the coefficient estimates as a weight to adjust for the fact that the coefficients have different levels of significance.[36]

<Table 5 around here>

Despite the differences in method and measurement, all these columns give a qualitatively similar result. To start with the less important variables, the estimation results show that neither the tariff nor the textile capability differentiates the post-quota performance of QCCs. Country size as measured by population is also not important in affecting export performance. Nevertheless, three other factors stand out, explaining the post-quota QCCs' differential export performance. First, in all specifications the measure of quota fill rate takes a positive and significant coefficient. This confirms the previous results that countries with high quota fill rate tend to perform better in the post-quota period. Based on the estimates, a one-unit increase in the average fill rate increases the export performance of the QCCs by about 3.5 per cent to 4.9 per cent, depending on the model, all other variables remaining constant. The equivalent elasticity of export performance to the aggregate fill rate (e.g. at the mean fill rate 8 per cent) is between 0.27 and 0.40.

Second, the country level of labour cost is another major factor determining the differential performance of the QCCs. Both the alternative measures, per capita income and average wage, have a negative and significant coefficient. The magnitudes of the coefficients are close, in the

[35] Source: http://unstats.un.org/unsd/snaama/selbasicFast.asp.
[36] Frazer and Biesebroeck (2010) use a similar technique to adjust for different levels of significance of the estimated country coefficients.

range of –0.48 to –0.65. Given that both the dependent and explanatory variables are in log format, these coefficients could be interpreted as the elasticity of export performance to labour cost. According to these estimates, a 1 per cent rise in labour cost reduces the post-quota export performance of the QCCs by about 0.60 per cent to 0.65 per cent, all other things remaining constant. The implication is that those countries with lower labour cost benefited more from the removal of quota than those advanced economies in this group that are increasingly losing their comparative advantage due to rising income (labour cost). Third, the freight cost is in fact the most important factor explaining the heterogeneous performance of the QCCs in the post-quota period. As expected, it yields a negative and significant coefficient. The estimates suggest that a 1 per cent increase in the share of the cost of freight in import values to the US market reduces QCCs' performance by between 14.3 and 25.5 per cent.

7. Conclusions

On 1 January 2005, the international trade in textile and clothing (T&C) was freed from the quota restrictions that had persisted for more than four decades. In this paper we examined the post-quota-period export performance of the quota-constrained countries, QCCs, in the two major world clothing markets, the US and the EU-15. We used volume of clothing imports (disaggregated at the 4-digit level) from above 200 countries to each of these markets over the period 2000–09. Unlike previous studies, our data cover relatively longer post-quota years and allow us to understand the medium-term adjustment process following the removal of the quota. Using the difference-in-difference method with full fixed effects (country, product, time), we evaluated alternative categories of QCCs and also country-specific relative performance.

The empirical analysis in both the US and EU-15 markets shows that the post-quota performance of the QCCs is highly heterogeneous. The QCCs, when taken as one group and compared with the ROW, at best have not gained (EU-15 market) and at worst they even lost (US market). Differentiating the QCCs based on their quota fill rate, we find that the high-fill-rate countries performed positively and substantially. These results are not sensitive to a variety of robustness checks and are generally consistent with the prediction of the theory that those effectively constrained countries will increase their exports at the expense of other exporters. The magnitude of the gains of the high-fill-rate countries, however, depends on how we define the fill rate and also on market destination. The gains in the US market are generally higher than in the EU-15. For example, the QCCs with 80 per cent and above aggregate fill rate increased their volume of exports to the US market by about 105 per cent but only by 25 per cent to the EU-15. This difference reflects the fact that, unlike the US market, the number of QCCs and their share in the EU-15 market were relatively small as there are other major players that were not subject to quota limitation.

To shed further light on the extent of heterogeneity among the QCCs we estimated a country-specific regression and identified gainer–loser countries. For example, in the US market only 13 out of the 44 QCCs have a positive and significant coefficient and were identified as gainers *vis-à-vis* the ROW. The analysis in the EU-15 market similarly shows that only four out the 15 QCCs gained from quota removal. This shows that in both markets the majority of QCCs have not performed well following the removal of quotas. Indeed, almost half of the QCCs have a negative and significant coefficient, suggesting that they were better off under the quota regime.

The removal of the quotas has exposed not only the non-quota-constrained countries but also the weak QCCs to fiercer competition. The major beneficiaries of the policy change are a few large exporters, mainly from Asia. For example about three-quarters of the gainers in US market – China, Vietnam, Laos, India, Bangladesh, Pakistan, Cambodia, Indonesia and Malaysia – are from Southern and Eastern Asia. All of the four gainers in EU-15 (China, Vietnam, India and Pakistan) are also from Asia. This provides evidence consistent with the prediction that quota removal has led to increasing concentration of the clothing industry in a few countries. We formally examined the likely source of the differential performance among the QCCs. The results show that quota fill rate is positively associated with the post-quota export performance but it explains only a little of the variation in the performance of the QCCs. Other factors measuring country cost-competitiveness such as labour cost and international transport cost appear to be more important, impacting the differential post-quota-period export performance among the QCCs.

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Table 1: Definition and summary statistics of the main variables

Variable name	Variable description	Obs.	Mean	Std. Dev.	Min.	Max.
US market						
$\ln(x)$ volume	Log of import volume (100 kg)	39031	4.712	3.529	0	14.82
$\ln(x)$ value	Log of import value (1000s USD)	40044	12.40	3.498	5.28	22.47
AllQCC × PQP	Interaction, all QCCs and post-quota years	40044	0.190	0.392	0	1
Highfill_Fr80 × PQP	Interaction, high-fill-rate countries and post-quota-years dummy (fraction based)	40044	0.084	0.278	0	1
Highfill_Ag80 × PQP	Interaction, high-fill-rate countries and post-quota-years dummy (aggregate average based)	40044	0.043	0.203	0	1
$\ln f$	Log of one plus tariff-equivalent freight cost	39575	0.052	0.027	0.0045	0.373
$\ln T$	Log of one plus weighted average tariff rate at 4-digit level	40016	0.096	0.055	0	0.254
$\ln T\_sq$	Log of one plus weighted average tariff rate at 4-digit level squared	40016	0.012	0.011	0	0.065
ln(*USgdp_pc*)	Log of GDP per capita USA	40044	10.60	0.11	10.45	10.74
ln(*ex_gdp_pc*)	Log of GDP per capita of exporter country to the US market	39717	8.46	1.56	4.45	11.42
ln(*ex_gdp_pc*)*_sq*	Log of GDP per capita of exporter country to the US market squared	39717	73.97	25.99	19.84	130.30
ln(*pop*)	Log of population of the exporter country to the US market	39717	16.32	1.769	8.44	21.00
EU-15 market						
$\ln(x)$ volume	Log of import quantity (100 kg)	42950	4.59	3.47	0	16.04
$\ln(x)$ value	Log of import value (1000s euros)	42313	5.11	3.37	0	15.22
QCC × PQP	Interaction, all QCCs and post-quota years	48071	0.07	0.25	0	1
Highfill_Fr80 × PQP	Interaction, high-fill-rate countries and post-quota-years dummy (fraction based)	48071	0.03	0.18	0	1
Highfill_Ag80 × PQP	Interaction, high-fill-rate countries and post-quota-years dummy (aggregate average based)	48071	0.02	0.13	0	1
$\ln f$	Log of one plus tariff-equivalent non-tariff trade cost	41609	0.98	0.23	0.532	2.01
$\ln T$	Log of one plus weighted-average tariff rate at four digit level	40355	0.04	0.05	0	0.12
lnT_sq	Log of one plus weighted-average tariff rate at four digit level squared	40355	0.004	0.01	0	0.02
ln(*EU15gdp_pc*)	Log of GDP per capita EU-15 average	48071	10.18	0.08	10.05	10.29
ln(*ex_gdp_pc*)	Log of GDP per capita of exporter country to the EU-15 market	47273	8.13	1.54	4.45	11.61
ln(*ex_gdp_pc*)*_sq*	Log of GDP per capita of exporter country to the EU-15 market squared	47273	68.49	25.04	19.84	134.82
ln(*pop*)	Log of population of the exporter country to the EU-15 market	47273	15.90	2.11	8.44	20.99

Table 2: Main results, US clothing market

Dependent variable ln(import quantity)	Treatment group All QCCs			Treatment group high-fill-rate QCCs			
				Highfill_Fr80		*Highfill_Ag80*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: average post–quota–period performance							
AllQCC × PQP	–0.12	–0.11	–0.11				
	(0.05)**	(0.05)**	(0.05)**				
Highfill_Fr80 × PQP				0.47	0.45		
				(0.07)***	(0.07)***		
Highfill_Ag80 × PQP						1.09	1.05
						(0.09)***	(0.09)***
ln(*1 + tariff*)		0.511	3.889		3.419		3.085
		(0.566)	(1.503)***		(1.508)**		(1.509)**
ln(*1 + tariff*)*_sq*			–17.871		–16.202		–15.016
			(7.212)**		(7.232)**		(7.237)**
ln(*1 + trns_cost*)		–3.816	–3.751		–3.462		–2.443
		(1.867)**	(1.873)**		(1.864)*		(1.905)
R-squared	0.67	0.67	0.67	0.67	0.67	0.67	0.67
# of observations	39011	38517	38517	39011	38517	39011	38517
# of countries	202	185	185	202	185	202	185
# of QCCs	44	44	44	17	17	9	9
Panel B: year–by–year post–quota–period performance							
2005	–0.023	–0.004	–0.004	0.502	0.381	0.741	0.725
	(0.050)	(0.051)	(0.051)	(0.075)***	(0.063)***	(0.085)***	(0.086)***
2006	–0.052	–0.045	–0.046	0.491	0.443	0.898	0.874
	(0.057)	(0.058)	(0.058)	(0.083)***	(0.070)***	(0.095)***	(0.096)***
2007	–0.141	–0.142	–0.149	0.525	0.465	1.097	1.055
	(0.063)**	(0.064)**	(0.064)**	(0.091)***	(0.076)***	(0.101)***	(0.103)***
2008	–0.227	–0.201	–0.193	0.39132	0.483	1.223	1.205
	(0.068)***	(0.069)***	(0.069)***	(0.063)***	(0.083)***	(0.108)***	(0.109)***
2009	–0.185	–0.183	–0.191	0.465	0.490	1.475	1.426
	(0.073)**	(0.073)**	(0.073)***	(0.070)***	(0.091)***	(0.113)***	(0.115)***
ln(*1 + tariff*)		0.519	3.908		3.389		2.887
		(0.568)	(1.510)***		(1.513)**		(1.514)*
ln(*1 + tariff*)*_sq*			–17.895		–16.107		–14.355
			(7.225)**		(7.243)**		(7.250)**
ln(*1 + trns_cost*)		–3.814	–3.749		–3.462		–2.448
		(1.865)**	(1.870)**		(1.865)*		(1.906)
R-squared	0.67	0.67	0.67	0.67	0.67	0.67	0.67
# of observations	39011	38517	38517	39011	38517	39011	38517
# of countries	202	185	185	202	185	202	185
# of QCCs	44	44	44	17	17	9	9

Notes: Robust standard errors in parentheses, significant at 10 per cent; ** significant at 5 per cent; and *** significant at 1 per cent. All estimations control for country, year and product fixed effects. Panel A and B provide results from separate estimations, the former using one dummy to capture the post–quota period and the latter the full post–quota group of years (2005–09).

Table 3: Main results, EU-15 clothing market

Dependent variable ln(import quantity)	Treatment group all QCCS			Treatment group high-fill-rate QCCs: *Highfill_Fr80*		Treatment group high-fill-rate QCCs: *Highfill_Ag80*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: average post-quota-period performance							
AllQCC × PQP	–0.02	0.03	0.004				
	(0.05)	(0.05)	(0.05)				
Highfill_Fr80 × PQP				0.22	0.25		
				(0.10)**	(0.07)***		
Highfill_Ag80 × PQP						0.22	0.22
						(0.06)***	(0.10)**
ln(*1* + *tariff*)		0.153	7.63		7.07		7.57
		(0.587)	(2.916)***		(2.91)**		(2.89)***
ln(*1* + *tariff*)*_sq*			–69.46		–65.46		–69.22
			(28.18)**		(28.14)**		(28.04)**
ln(*1* + *trns_cost*)		–1.043	–1.026		–1.178		–1.007
		(0.368)***	(0.369)***		(0.363)***		(0.358)***
R-squared	0.72	0.73	0.73	0.72	0.73	0.72	0.73
Observations	42313	34257	34257	42313	34257	42313	34257
# of countries	194	139	139	194	139	194	139
# of QCCs	15	15	15	7	7	4	4
Panel B: year-by-year post-quota-period performance							
2005	–0.087	–0.02611	–0.038	0.080	0.129	0.102	0.121
	(0.0507)*	(0.05117)	(0.052)	(0.061)	(0.065)**	(0.093)	(0.097)
2006	0.066	0.105	0.084	0.230	0.246	0.201	0.201
	(0.053)	(0.055)*	(0.055)	(0.063)***	(0.067)***	(0.092)**	(0.096)**
2007	0.032	0.063	0.042	0.317	0.335	0.344	0.348
	(0.064)	(0.064)	(0.064)	(0.067)***	(0.071)***	(0.101)***	(0.105)***
2008	–0.026	0.034	0.005	0.274	0.275	0.292	0.266
	(0.066)	(0.067)	(0.067)	(0.077)***	(0.080)***	(0.117)**	(0.118)**
2009	–0.086	–0.050	–0.078	0.209	0.251	0.148	0.188
	(0.078)	(0.079)	(0.080)	(0.098)**	(0.099)**	(0.155)	(0.154)
ln(*1* + *tariff*)		0.169	7.658		7.002		7.574
		(0.588)	(2.920)***		(2.918)**		(2.897)***
ln(*1* + *tariff*)*_sq*			–69.545		–64.805		–69.241
			(28.226)**		(28.217)**		(28.089)**
ln(*1* + *trns_cost*)		–1.042	–1.025		–1.178		–1.007
		(0.368)***	(0.369)***		(0.363)***		(0.358)***
R-squared	0.72	0.73	0.73	0.72	0.73	0.72	0.73
Observations	42313	34257	34257	42313	34257	42313	34257
# of countries	194	139	139	194	139	194	139
# of QCCs	15	15	15	7	7	4	4

Notes: Robust standard errors in parentheses, significant at 10 per cent; ** significant at 5 per cent; and *** significant at 1 per cent. All estimations control for country, year and product fixed effects. Panel A and B provide results from separate estimations, the former using one dummy to capture the post-quota period and the latter the full post-quota group of years (2005–09).

Table 4: Robustness checks for the US and EU-15 markets

		Intra-EU-15 imports included	Control group PRFs	China excluded	Imports, value based	Extra controls added	Time pre-post quota aggregation	Zero obser. included (Tobit)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: the US market								
1	*AllQCC* × *PQP*		–0.30	–0.18	–0.10	–0.12	–0.01	–0.27
			(0.07)***	(0.05)***	(0.05)*	(0.05)**	(0.05)	(0.06)***
2	*Highfill_Fr80* × *PQP*		0.53	0.34	0.34	0.37	0.38	0.38
			(0.07)***	(0.07)***	(0.06)***	(0.07)***	(0.08)***	(0.07)***
3	*Highfill_Ag80* × *PQP*		1.25	0.91	0.95	0.75	0.97	0.96
			(0.09)***	(0.10)***	(0.09)***	(0.10)***	(0.08)***	(0.10)***
	Observations		22500	38097	39547	38482	7918	88880
	R-squared		0.67	0.66	0.66	0.67	0.71	
Panel B: the EU-15 market								
1	*AllQCC* × *PQP*	–0.03	0.13	–0.10	–0.07	0.03	–0.01	–0.154
		(0.05)	(0.06)**	(0.05)*	(0.05)	(0.05)	(0.06)	(0.055)***
2	*Highfill_Fr80* × *PQP*	0.21	0.37	0.07	0.17	0.26	0.14	0.150
		(0.07)***	(0.07)***	(0.07)	(0.06)***	(0.06)***	(0.07)*	(0.065)**
3	*Highfill_Ag80* × *PQP*	0.19	0.35	–0.13	0.16	0.26	0.20	0.160
		(0.10)*	(0.10)***	(0.12)	(0.09)*	(0.08)***	(0.10)*	(0.097)
	Observations	39587	14906	33817	34257	34257	7677	85803
	R-squared	0.77	0.76	0.72	0.76	0.74	0.77	

Notes: Robust standard errors in parentheses * significant at 10 per cent; ** significant at 5 per cent; and *** significant at 1 per cent.

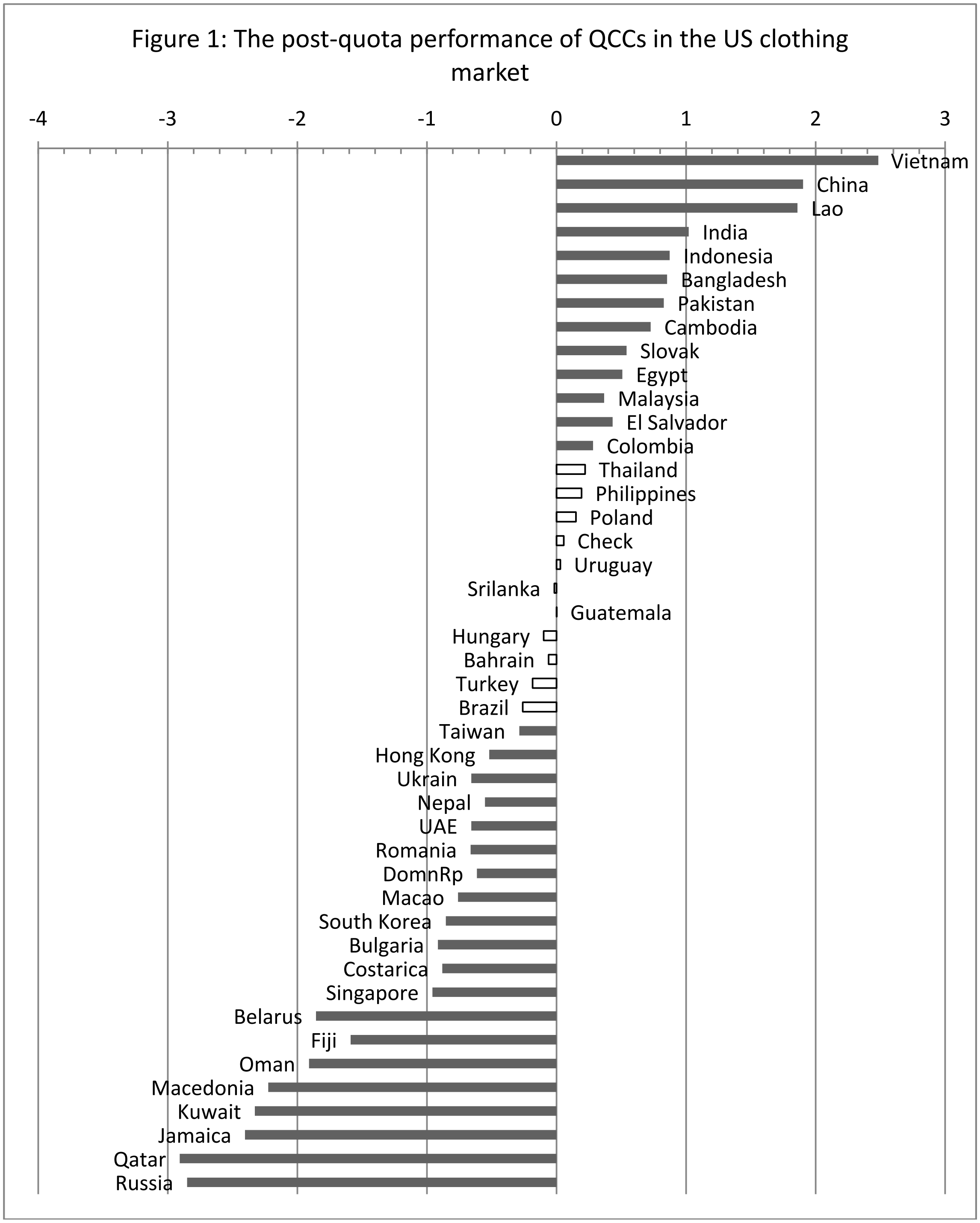
All estimations control for country, year and product fixed effects. The top panel reports results for the USA, and the bottom panel results for the EU-15. The results in the above table are based respectively on 18 and 21 different estimations in each market. Tariff and transport costs are controlled in all columns except the last one. Column 5 introduces additional controls such as GDP per capita of the exporting and importing country and population. But for the sake of presentation only the coefficients of the main variable of interest, i.e. indicators of quota constraint, are reported.

Table 5: Explaining the country-level QCCs' export performance in the US market

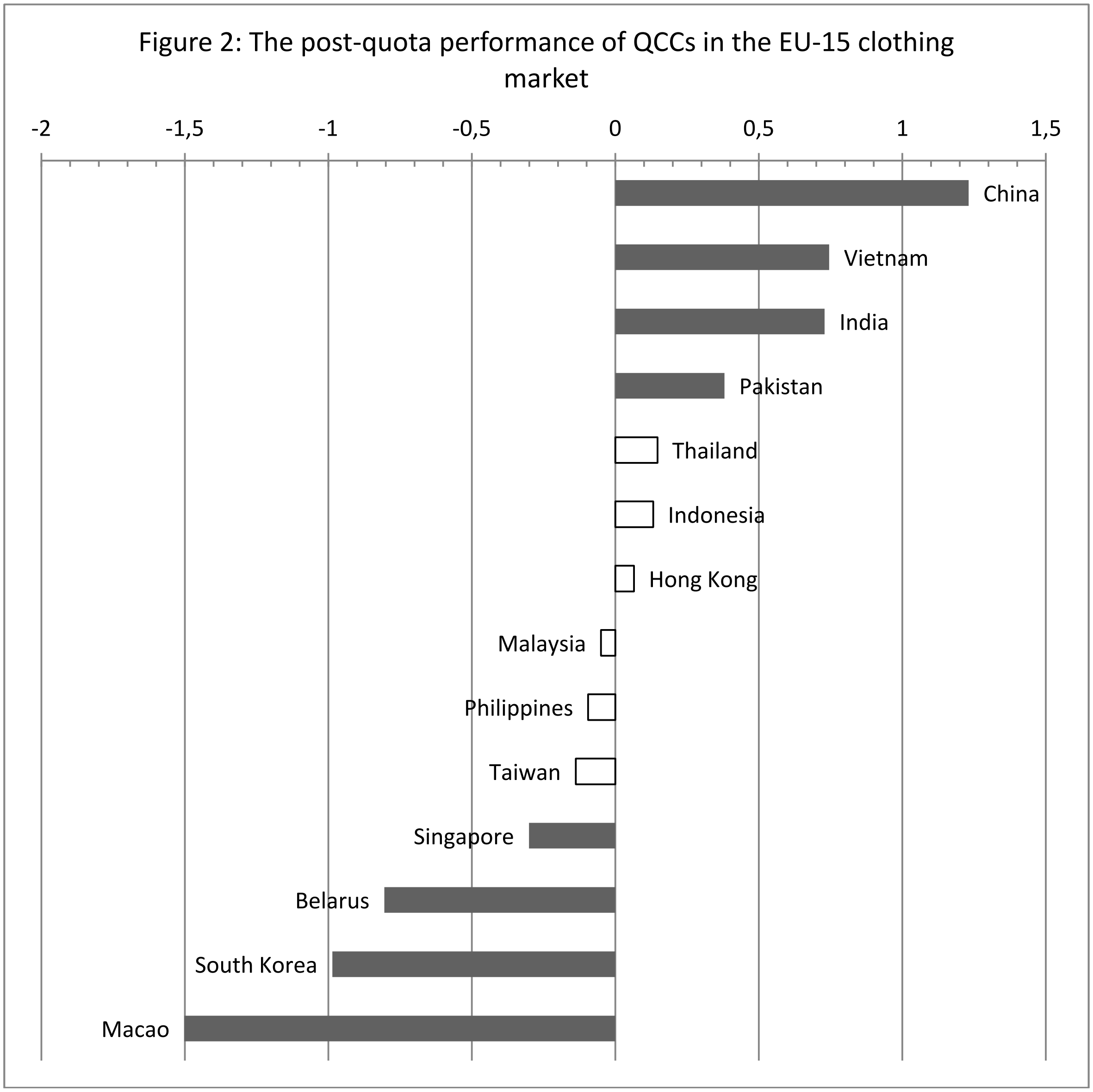
	Dependent variable country coefficients			
	(1)	(2)	(3)	(4)
Quota fill rate (per cent)	0.035	0.033	0.049	0.046
	(0.014)**	(0.015)**	(0.018)**	(0.021)**
ln(*gdp_pc*)	–0.527		–0.636	
	(0.171)***		(0.219)***	
ln(*wage_av*)		–0.484		–0.649
		(0.203)**		(0.240)**
ln(*pop*)	0.053	0.182	–0.036	0.095
	(0.144)	(0.126)	(0.197)	(0.175)
ln(*1 + tariff*)	–1.889	–1.903	–6.769	–8.711
	(3.848)	(5.221)	(5.958)	(7.049)
ln(*1 + trns_cost*)	–14.316	–21.192	–16.604	–25.561
	(5.069)***	(11.248)*	(6.218)**	(13.512)*
RCA_textile	–0.013	0.013	–0.010	0.021
	(0.021)	(0.021)	(0.030)	(0.028)
Observations	220	175	220	175
R-squared	0.45	0.48	0.44	0.47

Notes: Robust standard errors in parentheses; * significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent.

All estimations control for year fixed effects. The dependent variable in all estimations is the coefficient generated from the QCC level and full post-quota-years estimation. Columns 3 and 4 use the inverse of the standard deviation of the coefficient estimates as a weight to adjust for the difference in the statistical significance among the coefficients.



Notes: The bars represent coefficients from the country-specific DD estimation based on the main model that controls for tariff and transport costs. Shaded bars indicate significant coefficients at 10 per cent or higher level. See Table A2 column I for full results.



Notes: The bars represent coefficients from the country-specific DD estimation based on the main model that controls for tariff and transport costs. Shaded bars indicate significant coefficients at 10 per cent or higher level. See Table A3 column I for full results.

Appendix A1: List of QCCs in the US and EU-15 apparel markets, 2000 and 2004

	The US apparel market					The EU-15 apparel market				
Country	Number of MFA category under quota limit in		Aggregate fill rate		Ratio of MFA catg. with fill rate >=80 per cent	Number of MFA category under quota limit in		Aggregate fill rate		Ratio of MFA catg. with fill rate >=80 per cent
	2000	2004	2000	2004	2004	2000	2004	2000	2004	2004
Bahrain	2	2	0.35	0.01	0.00					
Bangladesh	21	20	1.00	0.82	0.60					
Belarus	-	2	-	0.95	1.00	16	16	90.2	33.8	0.19
Brazil	13	10	0.30	0.33	0.10					
Bulgaria	5	5	0.71	0.64	0.00					
Cambodia	12	13	0.85	0.83	0.46					
China	80	62	0.95	0.91	0.66	39	23	95.3	90.7	0.78
Colombia	1	1	0.80	0.59	0.00					
Costa Rica	5	5	0.64	0.12	0.00					
Czech Rep.	3	3	0.11	0.04	0.00					
Dominican Rep.	13	13	0.81	0.24	0.08					
Egypt	4	4	0.55	0.43	0.00					
El Salvador	1	1	0.86	0.11	0.00					
Fiji	2	2	0.91	0.68	0.00					
Guatemala	5	5	0.87	0.42	0.40					
Hong Kong	56	47	0.80	0.65	0.30	28	18	74.2	62.2	0.33
Hungary	7	7	0.16	0.03	0.00					
India	16	15	0.98	0.84	0.60	12	10	89.4	89.1	0.80
Indonesia	30	28	0.95	0.81	0.54					
Jamaica	8	8	0.12	0.02	0.00					
Korea, South	49	43	0.59	0.66	0.44	28	20	69.1	70.7	0.20
Kuwait	3	3	0.20	0.01	0.00					
Laos	1	1	0.38	0.02	0.00					
Macau	22	21	0.84	0.73	0.52	22	14	92.0	89.4	0.43
Macedonia	5	5	0.60	0.33	0.20					
Malaysia	22	20	0.70	0.41	0.20	7	7	53.9	31.7	0.14
Nepal	2	9	0.89	0.28	0.00					
Oman	9	7	0.80	0.47	0.00					
Pakistan	7	23	0.67	0.81	0.52	9	8	55.5	52.6	0.38
Philippines	25	29	0.92	0.56	0.48	16	11	35.8	40.1	0.18
Poland	34	7	0.81	0.03	0.00					
Qatar	7	3	0.06	0.33	0.00					
Romania	3	22	0.67	0.05	0.09					
Russia	23	1	0.13	0.00	0.00					
Singapore	1	22	0.66	0.13	0.05	7	7	17.0	8.3	0.00
Slovak Rep.	22	3	0.30	0.17	0.00					
Sri Lanka	3	26	0.46	0.67	0.27					
Taiwan	29	46	0.86	0.58	0.17	28	18	55.3	38.7	0.06
Thailand	53	24	0.56	0.62	0.33	11	7	61.1	71.7	0.29
Turkey	26	14	0.81	0.44	0.14					
Ukraine	16	4	0.75	0.83	0.25					
UAE	4	18	0.40	0.53	0.22					
Uruguay	19	6	0.92	0.03	0.00					
Vietnam	6	22	0.01	0.92	0.50	22	22	89.8	60.9	0.14
N. Korea						32	32	32.5	26.6	0.03
Average		**14.4**			**0.208**					**0.285**

Notes: The aggregate fill rate is the ratio of aggregate imports of apparel from the given country to the aggregate base of apparel quota specified by the USA/EU-15 for that country in a given year. The ratio of MFA category under quota limit with fill rate of 80 per cent and greater is defined by the share of MFA categories of the exporting country with 80 per cent and greater fill rate in the total number of MFA categories the under quota limit.

Table A2: Results from country-specific estimation for the US clothing market

QCC post-quota	Main model		Tariff & transport costs excluded		Censored model (Tobit) with zero obs.		Value based (1000s USD)	
	I		II		III		IV	
	coef.	se. robust	coef.	se. robust	coef.	se. robust	coef.	se. robust
Vietnam	2.484	(0.208)***	2.488	(0.209)***	2.715	(0.204)***	2.557	(0.211)***
China	1.903	(0.125)***	1.926	(0.124)***	1.714	(0.125)***	1.633	(0.114)***
Laos	1.86	(0.410)***	1.872	(0.410)***	2.822	(0.393)***	1.588	(0.453)***
India	1.021	(0.135)***	1.038	(0.135)***	0.836	(0.138)***	0.929	(0.147)***
Indonesia	0.874	(0.152)***	0.906	(0.152)***	0.787	(0.155)***	0.705	(0.147)***
Bangladesh	0.854	(0.127)***	0.869	(0.128)***	0.703	(0.154)***	0.767	(0.155)***
Pakistan	0.828	(0.152)***	0.843	(0.152)***	0.620	(0.131)***	0.611	(0.136)***
Cambodia	0.727	(0.260)***	0.735	(0.261)***	1.003	(0.295)***	0.579	(0.252)**
Slovak Rep.	0.541	(0.277)*	0.577	(0.275)**	1.115	(0.290)***	0.675	(0.262)**
Egypt	0.508	(0.195)***	0.504	(0.194)***	0.443	(0.207)**	0.334	(0.225)
Malaysia	0.368	(0.183)**	0.375	(0.183)**	0.474	(0.255)*	0.161	(0.170)
El Salvador	0.433	(0.223)*	0.352	(0.218)	0.407	(0.194)**	0.024	(0.205)
Colombia	0.282	(0.157)*	0.265	(0.157)*	0.096	(0.159)	0.300	(0.152)**
Thailand	0.221	(0.155)	0.244	(0.156)	–0.048	(0.153)	0.227	(0.107)**
Philippines	0.194	(0.146)	0.187	(0.144)	0.030	(0.146)	0.027	(0.144)
Poland	0.15	(0.173)	0.179	(0.173)	0.094	(0.186)	0.416	(0.172)**
Czech Rep.	0.056	(0.187)	0.074	(0.187)	–0.031	(0.210)	0.494	(0.239)**
Uruguay	0.03	(0.289)	0.016	(0.285)	0.182	(0.258)	0.114	(0.317)
Sri Lanka	–0.017	(0.196)	–0.022	(0.201)	–0.026	(0.185)	–0.118	(0.202)
Bahrain	–0.061	(0.585)	–0.144	(0.584)	0.363	(0.511)	–0.570	(0.596)
Guatemala	0.002	(0.202)	–0.083	(0.195)	–0.228	(0.206)	–0.252	(0.201)
Hungary	–0.099	(0.176)	–0.099	(0.176)	–0.196	(0.236)	–0.046	(0.187)
Brazil	–0.261	(0.247)	–0.271	(0.246)	–0.351	(0.244)	0.178	(0.215)
Turkey	–0.184	(0.193)	–0.189	(0.192)	–0.379	(0.193)**	0.201	(0.172)
Ukraine	–0.658	(0.384)*	–0.544	(0.378)	–0.128	(0.356)	–0.286	(0.346)
Taiwan	–0.287	(0.119)**	–0.282	(0.118)**	–0.420	(0.155)***	–0.321	(0.123)***
Hong Kong	–0.519	(0.228)**	–0.504	(0.228)**	–0.600	(0.250)**	–0.605	(0.188)***
Nepal	–0.552	(0.268)**	–0.550	(0.267)**	–0.819	(0.282)***	–0.501	(0.255)**
UAE	–0.658	(0.211)***	–0.611	(0.208)***	–0.710	(0.269)***	–0.642	(0.207)***
Romania	–0.663	(0.224)***	–0.645	(0.223)***	–0.447	(0.261)*	–0.059	(0.234)
Domn. Rep.	–0.614	(0.202)***	–0.680	(0.197)***	–0.285	(0.227)	–0.765	(0.209)***
Macau	–0.760	(0.205)***	–0.739	(0.205)***	–0.405	(0.234)*	–0.749	(0.185)***
S. Korea	–0.854	(0.182)***	–0.853	(0.180)***	–1.077	(0.176)***	–0.860	(0.175)***
Bulgaria	–0.915	(0.242)***	–0.896	(0.242)***	–0.840	(0.272)***	–0.482	(0.224)**
Costa Rica	–0.882	(0.274)***	–0.931	(0.271)***	–0.725	(0.267)***	–0.685	(0.310)**
Singapore	–0.958	(0.255)***	–1.048	(0.248)***	–1.011	(0.315)***	–1.010	(0.213)***
Belarus	–1.856	(0.291)***	–1.788	(0.291)***	–1.753	(0.386)***	–1.468	(0.370)***
Fiji	–1.589	(0.437)***	–1.821	(0.379)***	–1.699	(0.409)***	–1.460	(0.355)***
Oman	–1.910	(0.308)***	–1.900	(0.308)***	–3.873	(0.414)***	–1.881	(0.355)***
Macedonia	–2.225	(0.319)***	–2.215	(0.315)***	–0.930	(0.357)***	–1.863	(0.304)***
Kuwait	–2.328	(0.292)***	–2.315	(0.291)***	–2.742	(0.630)***	–2.415	(0.377)***
Jamaica	–2.404	(0.465)***	–2.435	(0.464)***	–2.589	(0.381)***	–2.678	(0.480)***
Qatar	–2.908	(0.541)***	–2.803	(0.533)***	–2.695	(0.541)***	–3.135	(0.541)***
Russia	–2.851	(0.328)***	–2.866	(0.327)***	–3.575	(0.339)***	–2.427	(0.328)***
# observ.	38517		39011		88880		40044	
R-squared	0.68		0.68				0.67	

Notes: Robust standard errors in parentheses; * significant at 10 per cent; ** significant at 5 per cent; and *** significant at 1 per cent. All estimations are based on year, country and product fixed effects. The country coefficients are interaction terms with post-quota period and in all cases the control group is the ROW. In all columns except IV the dependent variable is the log of volume of imports.

Table A3: Results from country-specific estimation for the EU-15 clothing market

	Tariff & transport cost included	Tariff & transport cost excluded	Intra-EU-15 imports included	Censored model (Tobit) with zero obs.	Value based (1000 euros)
	I	II	III	IV	V
China	1.231	1.238	1.195	1.128	1.015
	(0.098)***	(0.093)***	(0.093)***	(0.094)***	(0.083)***
Vietnam	0.729	0.779	0.734	0.914	0.678
	(0.133)***	(0.132)***	(0.133)***	(0.139)***	(0.117)***
India	0.745	0.634	0.592	0.524	0.588
	(0.093)***	(0.089)***	(0.088)***	(0.090)***	(0.081)***
Pakistan	0.380	0.439	0.396	0.363	0.289
	(0.082)***	(0.069)***	(0.068)***	(0.088)***	(0.074)***
Thailand	0.147	0.159	0.116	0.054	0.193
	(0.091)	(0.087)*	(0.087)	(0.089)	(0.082)**
Indonesia	0.132	0.114	0.072	–0.001	0.057
	(0.092)	(0.089)	(0.088)	(0.090)	(0.084)
Hong Kong	0.065	0.001	–0.041	–0.104	–0.155
	(0.150)	(0.140)	(0.140)	(0.142)	(0.135)
Malaysia	–0.050	0.025	–0.019	–0.000	–0.150
	(0.159)	(0.161)	(0.161)	(0.172)	(0.136)
Philippines	–0.095	–0.119	–0.163	–0.255	–0.107
	(0.130)	(0.128)	(0.128)	(0.127)**	(0.135)
Taiwan	–0.138	–0.181	–0.223	–0.298	–0.378
	(0.124)	(0.117)	(0.117)*	(0.118)**	(0.108)***
North Korea		–0.570	–0.628	–1.694	–0.809
		(0.506)	(0.504)	(0.373)***	(0.478)*
Singapore	–0.301	–0.333	–0.375	–0.470	–0.392
	(0.154)*	(0.171)*	(0.170)**	(0.168)***	(0.133)***
Belarus	–0.805	–0.784	–0.826	–0.787	–0.697
	(0.233)***	(0.225)***	(0.226)***	(0.225)***	(0.210)***
South Korea	–0.986	–0.982	–1.025	–1.053	–0.981
	(0.185)***	(0.185)***	(0.184)***	(0.192)***	(0.170)***
Macau	–1.502	–1.372	–1.418	–1.168	–1.322
	(0.231)***	(0.230)***	(0.230)***	(0.239)***	(0.210)***
Observations	34257	42313	48907	85803	42313
R-squared	0.74	0.72	0.76		0.75

Notes: Robust standard errors in parentheses; * significant at 10 per cent; ** significant at 5 per cent; and *** significant at 1 per cent. All estimations are based on year, country and product fixed effects. The country coefficients are interaction terms with post-quota period and in all cases the control group is the ROW. In all columns except IV the dependent variable is the log of volume of imports.

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